

SG04/00305

PCT/SG2004/000305

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Date of Filing : 01 JUN 2004


REC'D 21 OCT 2004

WIPO PCT

Application Number : PCT/SG2004/000162

Applicant(s) /
Proprietor(s) of Patent : LIN, Feng; SU, Ling

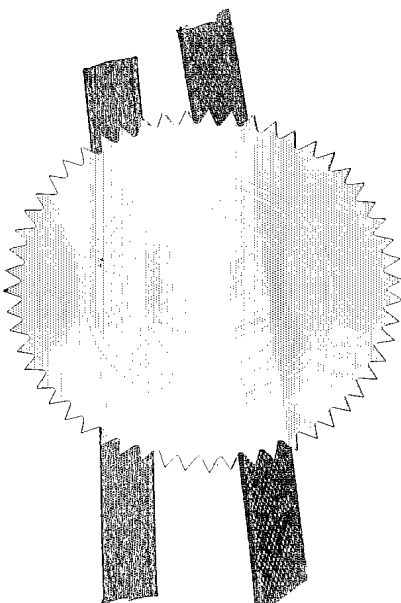
Title of Invention : NETWORK PRINTING SYSTEM


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18 Oct 2004

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0-1	International Application No.	PCT/SG 2004 / 000162
0-2	International Filing Date	01 JUN 2004 (07-06-2004)
0-3	Name of receiving Office and "PCT International Application"	REGISTRY OF PATENTS (SINGAPORE) PCT INTERNATIONAL APPLICATION
0-4	Form - PCT/RO/101 PCT Request	
0-4-1	Prepared Using	PCT-SAFE [EASY mode] Version 3.50 (Build 0002.158)
0-5	Petition The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty	
0-6	Receiving Office (specified by the applicant)	Intellectual Property Office of Singapore (RO/SG)
0-7	Applicant's or agent's file reference	3
I	Title of Invention	NETWORK PRINTING SYSTEM
II	Applicant	
II-1	This person is:	applicant and inventor
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IV-1	Agent or common representative; or address for correspondence No agent or common representative is/ has been appointed; the following special address should be used as:	address for correspondence	
IV-1-1	Name (LAST, First)	LIN, Feng	
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V	DESIGNATIONS		
V-1	The filing of this request constitutes under Rule 4.9(a), the designation of all Contracting States bound by the PCT on the international filing date, for the grant of every kind of protection available and, where applicable, for the grant of both regional and national patents.		
VI-1	Priority claim of earlier international application		
VI-1-1	Filing date	01 March 2004 (01.03.2004)	
VI-1-2	Number	PCT/SG2004/000044	
VI-1-3	PCT receiving Office	SG	
VI-2	Priority document request The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) identified above as item(s):	VI-1	
VII-1	International Searching Authority Chosen	Austrian Patent Office (ISA/AT)	
VIII	Declarations	Number of declarations	
VIII-1	Declaration as to the identity of the inventor	-	
VIII-2	Declaration as to the applicant's entitlement, as at the international filing date, to apply for and be granted a patent	-	
VIII-3	Declaration as to the applicant's entitlement, as at the international filing date, to claim the priority of the earlier application	-	
VIII-4	Declaration of inventorship (only for the purposes of the designation of the United States of America)	1	
VIII-5	Declaration as to non-prejudicial disclosures or exceptions to lack of novelty	-	

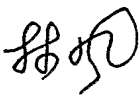
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VIII-4-1	<p>Declaration: Inventorship (only for the purposes of the designation of the United States of America) Declaration of Inventorship (Rules 4.17(iv) and 51bis.1(a)(iv)) for the purposes of the designation of the United States of America:</p>	<p>I hereby declare that I believe I am the original, first and sole (if only one inventor is listed below) or joint (if more than one inventor is listed below) inventor of the subject matter which is claimed and for which a patent is sought.</p> <p>This declaration is directed to the international application of which it forms a part (if filing declaration with application).</p> <p>I hereby declare that my residence, mailing address, and citizenship are as stated next to my name.</p> <p>I hereby state that I have reviewed and understand the contents of the above-identified international application, including the claims of said application. I have identified in the request of said application, in compliance with PCT Rule 4.10, any claim to foreign priority, and I have identified below, under the heading "Prior Applications", by application number, country or Member of the World Trade Organization, day, month, and year of filing, any application for a patent or inventor's certificate filed in a country other than the United States of America, including any PCT international application designating at least one country other than the United States of America, having a filing date before that of the application on which foreign priority is claimed.</p>
VIII-4-1-1	Prior applications:	

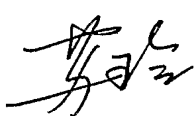
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		<p>I hereby acknowledge the duty to disclose information that is known by me to be material to patentability as defined by 37 C.F.R. § 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the PCT international filing date of the continuation-in-part application. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.</p>
VIII-4-1-1-1	Name (LAST, First)	LIN, Feng
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VIII-4-1-1-3	Mailing address:	BLK 110, #12-120, Woodlands Street 13 730110 Singapore Singapore
VIII-4-1-1-4	Citizenship:	CN
VIII-4-1-1-5	Inventor's Signature: (if not contained in the request, or if declaration is corrected or added under Rule 26ter after the filing of the international application. The signature must be that of the inventor, not that of the agent)	
VIII-4-1-1-6	Date: (of signature which is not contained in the request, or of the declaration that is corrected or added under Rule 26ter after the filing of the international application)	30/05/2004

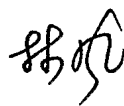
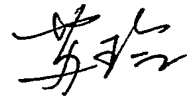
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VIII-4-1-2-4	Citizenship:	CN
VIII-4-1-2-5	Inventor's Signature: (if not contained in the request, or if declaration is corrected or added under Rule 26ter after the filing of the international application. The signature must be that of the inventor, not that of the agent)	
VIII-4-1-2-6	Date (of signature which is not contained in the request, or of the declaration that is corrected or added under Rule 26ter after the filing of the international application)	May 20, 2004

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IX	Check list	number of sheets	electronic file(s) attached
IX-1	Request (including declaration sheets)	7	✓
IX-2	Description	12	-
IX-3	Claims	4	-
IX-4	Abstract	1	✓
IX-5	Drawings	6	-
IX-7	TOTAL	30	
Accompanying Items		paper document(s) attached	electronic file(s) attached
IX-8	Fee calculation sheet	✓	-
IX-17	PCT-SAFE physical media	-	✓
IX-19	Figure of the drawings which should accompany the abstract	3	
IX-20	Language of filing of the international application	English	
X-1	Signature of applicant, agent or common representative		
X-1-1	Name (LAST, First)	LIN, Feng	
X-1-2	Name of signatory		
X-1-3	Capacity		
X-2	Signature of applicant, agent or common representative		
X-2-1	Name (LAST, First)	SU, Ling	
X-2-2	Name of signatory		
X-2-3	Capacity		

FOR RECEIVING OFFICE USE ONLY

10-1	Date of actual receipt of the purported international application	01 JUN 2004 (01-06-2004)
10-2	Drawings:	
10-2-1	Received	
10-2-2	Not received	
10-3	Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application	
10-4	Date of timely receipt of the required corrections under PCT Article 11(2)	
10-5	International Searching Authority	ISA/AT
10-6	Transmittal of search copy delayed until search fee is paid	

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11-1	Date of receipt of the record copy by the International Bureau	
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NETWORK PRINTING SYSTEM

Background of the Invention

1. Field of the Invention

This invention relates to a network printing system for printing electronic documents
5 (forms) via a local area network (LAN).

2. Description of Related Art

Big or small, every business relies on pre-printed forms and stationery. From invoices
to form letters, these forms can often form the lifeblood of a company's internal and
external communications. However they also tend to form the bulk of a company's
10 garbage. Misused, mis-printed, damaged and outdated forms all end up in the trashcan,
wasting money and creating unnecessary refuse. Printing costs can also be significant,
and even storage can place a drain on company resources.

Electronic forms provide a cost-effective solution by eliminating the unnecessary
ordering, shipping, spending and storing of professionally printed forms. With electronic
15 forms, forms are printed as needed.

One existing solution of the electronic form is on the HP Flash DIMM (Dual Inline
Memory Module) technology, you can print all of your invoices, forms and letterhead
accurately and on-demand, using HP LaserJet printers. Flash DIMMs provide non-volatile,
rewritable memory for these printers, and the forms are stored in the Flash DIMM
20 modules. These forms are constantly and immediately available to the printer, eliminating
form downloading times and reducing overall printing times. Additional forms can also be
saved to the printer's hard drive. This Flash DIMM can act as a stationery cupboard,
replacing the need to stock boxes of forms. Better still, when a form becomes obsolete,
you can simply reprogram the module - no more throwing out boxes of outdated forms.

25 However, the Flash DIMM solution has disadvantages: (1) many regular printers have
no sockets for Flash DIMM modules; (2) if a management wants to print electronic forms
in a company, he has to install Flash DIMMs in every printer; (3) if a form is updated, it has
to be reprogrammed to every printer; and (4) forms are stored in the Flash DIMM of
printer, so it is not possible to fill in forms with the data created in the computer on the fly.

30 Electronic forms may be distributed in the email or put in the website for staffs to print.
However, some of them cannot print these forms, because they have no computers or
suitable printing software/drivers, or their computers do not connect to appropriate printers
such as color laser printers.

Summary of the Invention

35 An object of the present invention is to provide an easy and simple way to print

electronic documents (forms) at the appropriate printers.

Another object is to use one central server to work for many printers, and to manage and update documents in the central server only.

Another object is to use a low cost and simple keypad to select and print documents.

5 Another object is to provide a method of printing documents for the staff, which has no computers, no print software or no connections to the printers.

A network printer system includes a LAN, a server, network printers and network keypads. The server connects by use of the LAN to the printers and keypads. A method for printing a document in the network printing system includes: (1) a user presses number
10 keys to enter document number on a keypad; (2) the keypad sends to the server a print-request that includes the document number and the keypad IP address; (3) the server receives the print-request and identifies the document and the keypad; (4) the server, in accordance with an assignment that assigns documents to keypads, determines an appropriate document among the documents that are assigned to the keypad; (5) in order
15 to print the document at an appropriate printer such as near to the user and suitable to print the document, the server, in accordance with another assignment that assigns printers to keypads, determines an appropriate printer among the printers that are assigned to the keypad; (6) the server retrieves the appropriate document; and (7) the server prints the document to the appropriate printer via the LAN.

20 Brief Description of the Drawings

FIG.1 is a block diagram of a network keypad according to the present invention.

FIG.2 is a data packet of the print-request issued by a network keypad according to the present invention.

FIG.3 illustrates a network printing system according to the present invention.

25 FIG.4A and 4B are block diagrams of a network printer with the function of network keypad on printer or its print server according to the present invention.

FIG.5 is a block diagram of a network mail delivery system of the present invention.

FIG.6 is a block diagram of a network barcode or smart card reader according to the present invention.

30 FIG.7 is a block diagram of a cordless network keypad of the present invention.

FIG.8 is a block diagram of an infrared keypad and network printer according to the present invention.

FIG.9 is a block diagram of another keypad device of the present invention.

35 FIG.10 illustrates the printing system with keypad device of FIG 10 according to present invention.

Detailed Description of the Preferred Embodiments

Preferred embodiments of the present invention will now be described in details with reference to the accompanying drawings.

FIG.1 is a block diagram of a network keypad according to the present invention.

FIG.2 is a data packet of the print-request issued by a network keypad according to the present invention.

A network keypad of the present invention consists of keypad 1, LCD 2, 8-bit microprocessor 3 and network interface 4. Keypad 1 has number keys 0-9 and PRINT key. A user can press number keys to enter (select) a document number, such as press 1001 to select document "1001"; after that, press PRINT key to issue a print-request 6 to a server. LCD 2 shows the document number and other status. Network interface 4 connects the network keypad to LAN 5. And 8-bit microprocessor 3 controls keypad 1, LCD 2 and network interface 4, and processes user's requests.

Microprocessor 3 runs the TCP/IP protocol, and a server IP address is set up in its memory, so the network keypad can communicate to the server, and send the data packet of the print-request 6. FIG.2 shows the fields of a print-request 6, including the server IP address, the network keypad IP address, the identification of the print-request, and the document number.

An 8-bit microprocessor module RCM2200 (a product of Rabbit Semiconductor), which includes microprocessor, memory, network interface and input/output ports for connecting to additional LCD and keypad, can be used to build a network keypad easily and at low cost.

By using the network keypad, the steps for a user to print a document such as document "1001" are: (1) the user presses keys 1001 and PRINT key on keypad 1; (2) microprocessor 3 gets 1001 as document number, and issues a packet of the print-request 6 to a server via LAN 5; (3) the server prints document "1001" at the appropriate printer, which is near to the user and suitable for printing document "1001".

One advantage of the invention is the simple and easy operation: by pressing a few keys (such as number keys 1001 and PRINT key) only, a user can select and print a document ("1001"). And another advantage is that the network keypad is low cost.

FIG.3 illustrates a network printing system according to the present invention.

The network printing system comprises a LAN 5, a server 7, four network printers and two network keypads. The network keypad has been described in FIG.1 and FIG.2. The four printers and two keypads are installed in two printer rooms. Printer room 10 has a laser printer 12, a color laser printer 13 and a network keypad 11; and printer room 20 has a laser printer 22, a color laser printer 23 and a network keypad 21. Server 7 connects by use of LAN 5 to the four printers and two keypads. The TCP/IP network protocol and the

Ethernet run on LAN 5, to send and receive data packets between server 7 and network printers and keypads.

Server 7 is a computer (or multiple computers) running on a Microsoft Windows 2000 operating system. Printers 12 and 22 are HP LaserJet 1300n/4200n network printers; and printers 13 and 23 are HP color LaserJet 3500n network printers. A network printer includes a printer system and an internal network card, an internal print server or an external print server.

Server 7 stores documents on the disk. Table 8 has a column labeled "Document" that lists examples: "claim form.prn", "leave form.doc" and "color brochure.prn". However, server 7 may produce or import documents, e.g. by accessing a database. The documents are saved as either printer-specific data or program-specific data. For example, the document "claim form.prn" is saved as printer-specific data (such as HP PCL and PostScript. One method to create printer-specific data is to print to a file from the application using the driver for the selected printer). To print such document, server 7 sends directly the document via LAN 5 to the printer, for example, sends HP PCL data files (documents) over a TCP connection to TCP port 9100 on HP LaserJet 1300n/3500n printers. Another document "leave form.doc" is saved as program-specific (Microsoft Word) data. To print the document, server 7, by invoking the COM interface of Microsoft Word, launches the program, loads the document and prints it at the printer through a network printer software driver.

Server 7 includes table 8 that uses numbers to represent documents. For example, in the row 1 number "1001" represents the document "claim form.prn"; in the row 2 number "1002" represents the document "leave form.doc" and so on. The documents "claim form.prn", "leave form.doc" and "color brochure.prn" are simply referred to as documents "1001", "1002" and "1003" elsewhere in the description. By representing documents as numbers, a user can easily use a simple keypad to indicate the document that he wants to print. For example, a user can press number "1001" on a keypad if he wants to print the document "claim form.prn".

In order for server 7 to determinate an appropriate destination printer (such as near to a user or suitable to print a document), table 8 (now called as assignment table) includes columns named "Keypad 11" and "Keypad 21", which assign printers to keypads. As printer 12, 13 and keypad 11 are all at the printer room 10, in column "Keypad 11" printers 12 and 13 are assigned to keypad 11; and as printers 22, 23 and keypad 21 are all at the printer room 20, in column "Keypad 21" printers 22 and 23 are assigned to keypad 21. The meanings of the assigning are: (1) if server 7 receives a print-request 6 from keypad 11, in accordance with column "Keypad 11", it selects one of the assigned printers 12 and 13,

which are near to the user (keypad 11), as the destination printer; and (2) if server 7 receives a print-request 6 from keypad 21, in accordance with column "Keypad 21", it selects one of the assigned printers 22 and 23, which are near to the user (keypad 21), as the destination printer.

5 Refer to assignment table 8, the following examples describe how server 7 selects an appropriate destination printer according to the assignment of printers to keypads:

Example 1: server 7 receives a print-request for document "1001" from keypad 11. The number 1001 is in Row 1, and printer 12 is at the intersection of Row 1 and the column "Keypad 11", so server 7 selects the printer 12 as the destination printer to print
10 the document "1001".

Example 2: server 7 receives a print-request for document "1003" (i.e. color brochure) from keypad 11, server 7 selects the color printer 13, which is at the intersection of the Row 3 and the column "Keypad 11", as the destination printer.

Example 3: server 7 receives a print-request for document "1002" from keypad 11.
15 Printers 12 and 13 are at the intersection of Row 2 and the column "Keypad 11", so server 7 tries to use the printer 12 first. However, if printer 12 is busy or out of order, server 7 prints the document "1002" at the printer 13.

Example 4: server 7 receives a print-request of document "1001" from keypad 21, so server 7 selects the printer 22, which is at the intersection of the Row 1 and the column
20 "Keypad 21".

Assigning a plurality of printers to a keypad can make sure to print the document in the appropriate printer, for example, print a simple form at a black-white printer, but print a brochure at a color printer; print a multi-page data sheet at a two-sided printing printer; and print at another appropriate printer when the first destination printer is busy. One
25 advantage of the invention is to print documents at suitable printers.

Example 5: server 7 receives a print-request of document "1004" from keypad 11, it prints "sale result" of Row 4 at printer 12 or 13. However if server 7 receives a print-request of the same document "1004" from keypad 21, it prints "sale summary" of Row 5 because there is no printer in Row 4 for keypad 21, but Row 5 is for document "1004" too,
30 and there is printer 22. This assignment allows several documents to be under one document number. Another object of this assignment is: if offices have several types (laser, inkjet), brands (HP, Canon) or print languages (PCL, PostScript) of printer, the printer-specific data of one document are different among these printers, so there should be a plurality of files (documents) under one document number such as one for print
35 language PCL printer and another for print language PostScript printer. This shows that printed documents are selected according to the keypad and printer, and when the user

selects a document, the server determines the printed document according to the keypad and printer.

We can understand that an assignment may allow to print a document at a printer but not at another one; and when server 7 receives a print-request from a keypad and
 5 determinates one or more destination printers, these destination printers further determinate the printed selected document. That is, server 7 determines printed document according to the assignment of documents to printers.

Example 6: server 7 receives a print-request of document "1005" from keypad 11, it prints document "1005" at printer 13. However if server 7 receives a print-request of
 10 document "1005" from keypad 21, it does not print document "1005", because there is no printer at the intersection of Row 6 and column "Keypad 21", or the document "1005" is not assigned to Keypad 21. This assignment of documents to keypads separates and protects documents of different groups or departments. Let's see a clearer description.

For example, keypad 11 is in the sale department, and keypad 21 is in the production
 15 department. In order for the user to know the document numbers, server 7 prints an index sheet 14 for keypad 11, which lists all documents that keypad 11 can request to print according to table 8; and server 7 also prints another index sheet 24 for keypad 21, which lists all documents that keypad 21 can request to print according to table 8. In the index
 20 sheet 14 of sale department, it lists the documents related with sale department i.e. "1005 sale report" and "1006 customer data", but does not include the documents related with production department i.e. "1007 production plan" and "1008 vendor data". In the index sheet 24 of production department, it lists the documents related with production
 25 department i.e. "1007 production plan" and "1008 vendor data", but does not include the documents related with sale department i.e. "1005" and "1006". With this assignment of documents to keypads, the persons of sale department can print documents of their own department, but cannot print documents of production department; and the persons of production department can print documents of their own department, but no documents of sale department. This shows more clearly that documents are selected and printed
 30 according to the keypad, and when the user selects a document, the server determines the (printed) selected document according to the keypad.

Example 7: a keypad is in a public place, and use password to prohibit unauthorized access. Key 9 in the column header "Keypad 21" shows that keypad 21 (such as in reception room) is protected by password. For example, refer to Row 1, when server 7
 35 receives a print-request of document "1001" from keypad 11, it knows the request from keypad 11, and prints the document at printer 12 immediately. However if server 7

receives a print-request from keypad 21, it knows the request came from keypad 21, and asks for password before print to printer 22.

All above examples show that server 7 determines a destination printer and printed document relying on assignments of printers and documents to keypads. So when server
 5 7 receives a print-request, it needs to know which keypad issues the request, that is, the packet of the print-request 6 arrives at server 7 with the identification information of the network keypad. The keypad IP address is convenient and preferred to be the identification information of the network keypad. However, unique data may be assigned to the keypad as its identification.

10 In the preferred embodiment, server 7 includes assignment table 8, and when server 7 operates according to the invention, it loads table 8 to its memory. However, the assignment in table 8 may be stored to each keypad either by downloading from server 7 or by an IT administrator.

A first example: because in the column "Keypad 11" printers 12 and 13 are assigned
 15 to keypad 11, server 7 downloads the identification information of printers 12 and 13 to keypad 11. Thereafter, if keypad 11 issues a print-request, the print-request includes the identification information of printers 12 and 13. When server 7 receives the print-request, according to table 8 and the document number in the print-request, server 7 determines an appropriate destination printer among printers 12 and 13. For example, for document
 20 "1001" server 7 selects printer 12, but for document 1003 it selects printer 13.

A second example: server 7 downloads the contents of the columns "Number" and "Keypad 11" to keypad 11. Thereafter, if a user enters a document number on keypad 11, keypad 11 selects an appropriate printer according to the document number and the downloaded contents, for document 1001 it selects printer 12, but for document 1003 it
 25 selects printer 13. Then keypad 11 issues a print-request that includes the identification information of the appropriate printer.

Summarily, the information in the print-request of a keypad assists server 7 to determine a destination printer, and the destination printer is among the printers that are assigned to the keypad.

30 FIG.4A and 4B are block diagrams of a network printer with the function of network keypad on printer or its print server according to the present invention.

The network keypad of FIG.1 has limited hardware and size is small, and a network printer 30 or its print server 33 has microprocessor and network interface, so the keypad tends to be built-in and mount on the printer 30 or its print server 33 to become as a part
 35 of the printer 30. Such printer 30 or its print server 33 has a keypad 31, and uses directly the microprocessor and network interface of printer 30 or print server 33 to issue the print-

request 6, to cause server 7 to print documents at printer 30 or at other printer according to assignment table 8. After understand the invention, skillful persons in the printer art can develop the new printers or print server that include the network keypad of the invention.

Now refer to FIG.1-4, in the network printing system of the invention, the overall procedures for printing document are described:

(1) in keypads 11 and 21, store their local IP addresses and server 7 IP address;

(2) on the disk of server 7, store documents "claim form.prn", "leave form.doc" and "color brochure.prn", and use numbers "1001", "1002", "1003" to represent these documents;

(3.1) in server 7, establish the assignment table 8 that assigns printers to keypads; or

(3.2) server 7 or an IT administrator, according to the assignment table 8, stores identification information of printers 12 and 13 to keypad 11; and stores identification information of printers 22 and 23 to keypad 21;

now the network printing system is ready to print documents for users,

(4) a user presses keys such as 1001 and PRINT key on keypad 11;

(5) keypad 11 sends a packet of print-request 6 to server 7, the print-request 6 includes number "1001", IP address of server 7, and IP address of keypad 11 (for above (3.1)) or identification information of the assigned printers 12 and 13 (for above (3.2));

(6) server 7 receives the print-request 6 and identifies the number "1001", then server 7, according to the row 1, retrieves the document "1001", i.e. the document "claim form.prn";

(7.1) for above (3.1), server 7 checks IP address in the print-request 6, and knows that keypad 11 issues the print-request 6. Then server 7 selects printer 12, which is at the intersection of the row 1 (document "1001") and the column "Keypad 11", as the destination printer; or

(7.2) for above (3.2), the row 1 of table 8 shows that printer 12 and 22 are suitable for printing document "1001", and the print-request specifies the assigned printers 12 and 13, so server 7 selects the printer 12, which is suitable for printing document "1001" and also among the assigned printers;

(8) server 7 checks file extension (i.e. ".prn", and ".doc") to determine the data type of documents. If a document is at printer-specific data such as HP PCL, server 7 sends the document to printer 12; however, if a document is at program (such as Microsoft Word) specific data, server 7 loads the document to the program by using COM technology; and

(9) finally, server 7 prints the document "claim form.prn" at the destination printer 12 via LAN 5.

FIG 5 is a block diagram of a network mail delivery system of the present invention.

The well-known mail delivery procedures are:

1. the sender writes a letter in a computer;
2. the sender prints the letter;
3. the sender puts the letter in a postbox;
- 5 4. the postman collects the letter from the postbox;
5. the processing machines/officers sorts and transports the letter;
6. the postman distributes the letter to the mailbox of the recipient;
7. the recipient opens the mailbox by key;
8. the recipient collects the letter.

10 By printing the sender's letter in the recipient's printer, i.e. moving above step 2 to between step 7 and 8, the invented mail delivery procedures are:

1. the sender writes a letter in a computer;
2. the sender puts the (electronic) letter onto a center mail system via network;
3. the recipient opens an electronic mailbox by personal ID and password;
- 15 4. the printer inside the mailbox prints the sender's letter;
5. the recipient collects the letter.

A network mail delivery system, according to above invented mail delivery procedures, consists of mail system 40, sender means 41 - 46, notification means 47 - 49, recipient means 50 - 54, and post office means 55.

20 Sender means are provided for senders to post letters to mail system 40, including:

- write a letter in the computer, and send the electronic letter to the mail system 40 by the computer via the network (41);
- scan a letter, and send the electronic letter to mail system by the computer via the network (42);
- 25 • fax a letter to a computer that sends the letter to mail system (43);
- send government (44), business (45) and publication (46) bulk letters to mail system 40 by the computer via the network.

30 The mail system 40 (consisting of computers for receiving, sending, processing, managing letters, providing public accesses; data storages for storing letters, addresses, personal IDs, postal fare records; and networks for connecting inside and outside computers), receives letters from the sender means, and identifies the addresses of the recipients from received electronic letters or information attached in the letters. The mail system 40 may notify the recipients of letters. The notification means includes:

- send Email to the recipient (47);
- 35 • send message to the hand phone or pager of the recipient (48);

- a smart card reader reads the personal ID from recipient's smart card, and accesses center mail server 40 to check letters (49);

Recipient means are provided for the recipient to collect letters, including:

- If the recipient is a corporation, the mail system 40 sends the letters those addressed with the corporation to the computer there, and the corporation's printer prints out the letters (50).
- Personal recipient uses PC to access mail system 40, and download letters (51).
- Like opening home mailboxes everyday, now users open the electronic mailboxes everyday. The public electronic mailboxes (53, 54) locate public places and become the mailboxes for everyone like before. The keys using to open the mailboxes (53, 54) are the personal IDs and passwords. The mailbox (53, 54) consists of printer and three input terminals. The printer is used for printing the letters. And the three input terminals, (keypad, barcode reader and smart card reader) are all provided in order for recipients to choose a suitable method to input personal ID and password. After receiving personal ID from any input terminal, the print server 52 accesses the center mail system 40, retrieves and prints the letters related with the personal ID in the printer (53, 54) immediately.

Post office means include:

- If any recipient does not collect his letters by recipient means for several days, such as one week or 10 days, the mail system 40 sends the letters to the post office (55) near the recipient, the printer in the post office (55) prints the letters, finally the postman delivers the letters to the recipient's home mailbox in one envelope.

That a print server (52) supports multiple network printers and network keypads (52, 53) has been described in FIG 3. The network barcode reader and network smart card reader (52, 53) introduce other input devices to FIG 3.

FIG.6 is a block diagram of a network barcode or smart card reader according to the present invention.

A network barcode or smart card reader consists of barcode or smart reader 60, microprocessor 61, and network interface 62 connecting to the LAN 5 of FIG 3. When the barcode or smart card reader 60 reads the personal ID from a user's barcode or smart card, the microprocessor 61 issues a print-request to the server 7 of FIG 3. The print-request includes the server IP address, the network barcode or smart card reader IP address, the identification of the print-request, and the personal ID of the user.

By using the network barcode or smart card reader, the steps for a user to print a document are: (1) the barcode or smart card reader 60 reads the personal ID from user's

barcode or smart card; (2) microprocessor 61 receives the personal ID, and issues a print-request packet to a server 7 via LAN 5; (3) the server 7, according to IP address of the network barcode or smart card reader, prints the document related with the personal ID at the appropriate printer, which is near the user.

5 FIG.7 is a block diagram of a cordless network keypad of the present invention.

FIG.8 is a block diagram of an infrared keypad and network printer according to the present invention.

The functions of the cordless network keypad are the same as the network keypad of FIG 1. A cordless network keypad consists of a remote controller 64 and a network
10 connector 65. The remote controller 64 includes a keypad 66, microprocessor 67 and infrared transceiver 68; and the network connector 65 includes infrared transceiver 69, microprocessor 70 and network interface 71 connecting to the LAN 5. In the remote controller 64, the user indicates document number in the keypad 66, the microprocessor 67 issues a print-request, and the infrared transceiver 68 transmits the print request to the
15 network connector 65. In the network connector 65, the infrared transceiver 69 receives the printer-request, and the microprocessor 70 sends the print-request packet to the server via network interface 71 and LAN 5. Other cordless technologies such as radio frequency (RF) can also be used as the communication media between the remote controller 64 and the network connector 65.

20 In FIG 8, it uses the remote controller 64 of FIG 7, however the network connector 65 of FIG 7 is built inside the printer system 72. For the kind of printer 72, the remote controller 64 and the built-in infrared transceiver, CPU and network interface of the printer 72 together assemble the network keypad according to the invention.

FIG.9 is a block diagram of another keypad device of the present invention.

25 FIG.10 illustrates the printing system with keypad device of FIG 9 according to present invention.

In FIG 3, the server 7 is used for storing documents. In this embodiment, the server 7 is removed, and the keypad device 80 stores documents. The keypad device 80 consists of a keypad 81, a microprocessor 82, a memory 83, a removable memory 84 and an
30 interface 85. The interface 85 can be a network interface, a USB interface, a parallel port interface, an infrared interface, or a radio frequency interface. The interface 85 communicates directly with the printer 86 via the LAN 5 or a direct cable 87 that connects directly between the interface 85 and the printer 86. The memory 83 and the removable memory 84 are used for storing documents. The documents are stored into the memory
35 83 and 84 by downloading over interface 85, or by inserting the removable memory card 84. The documents are at the printer-specific data format, thus such documents can be

sent directly to printer for printing. The operation of the printing system is: the user indicates a selected document number in the keypad 81, the microprocessor 82 retrieves the selected document from the memory 83 or 84, and sends it via the LAN 5 or direct cable 87 to printer 86, the printer 86 prints the selected document.

- 5 With the limited hardware components in the keypad device 80, the cost to product the keypad device 80 is very low and the size of keypad device 80 is small. Such keypad device 80 can be attached to the printer 80 by putting on the top or near the side of the printer 80, to provide a way for user to print forms (documents) easily. Another advantage of the keypad is the sample and easy operation: by pressing a few keys only, a user can
- 10 select and print forms (documents).

The FIG 3 is described with LAN 5, however it is obvious that it also works in WAN (Internet) because of IP technology.

Claims

1. A network printing system comprising:
a LAN;
5 a plurality of network printers;
a plurality of network keypads; and
a server connecting by use of said LAN to said plurality of network printers and said plurality of network keypads;

each of said plurality of network keypads comprising:
10 a keypad for the user to indicate the selected document; and
means for issuing, to said server via said LAN, the print-request that includes the identification information of said network keypad and said selected document;

said server comprising:
an assignment that assigns said plurality of network printers to said plurality of
15 network keypads;

means for receiving, via said LAN, the print-request issued by any of said plurality of network keypads;

means for decoding said print-request to identify the selected document and the network keypad that issues said print-request;

20 means for determining, in accordance with said assignment, an appropriate destination network printer among one or more network printers assigned to said network keypad;

means for retrieving said selected document; and

25 means for printing said selected document to said destination network printer via said LAN.

2. The network printing system of claim 1, said server further comprising an assignment that assigns plurality of documents to said plurality of network keypads, and means for determining said selected document among documents assigned to said network keypad in accordance with said assignment.

30 3. The network printing system of claim 1, said server further comprising an assignment that assigns plurality of documents to said plurality of network printers, and means for determining said selected document among documents assigned to said destination network printer in accordance with said assignment.

4. The network printing system of claim 2, wherein said determining destination printer further includes determining according to the selected document.

5. The network printing system of claim 2, wherein said determining selected document further includes determining according to said determined destination printer.

5 6. The network printing system of claim 1, the identification information of the network keypad is the IP address of said network keypad.

6. A computer program, stored in a computer readable medium, wherein the computer program is capable of causing a server, which connects by use of a LAN to a plurality of network printers and a plurality of network keypads, to perform:

10 loading an assignment that assigns said plurality of network printers to said plurality of network keypad;

receiving, via said LAN, the print-request that includes identification information of the selected document and the network keypad;

15 decoding said print-request to identify said selected document and said network keypad that issues said print-request;

determining, in accordance with said loaded assignment, an appropriate destination network printer among one or more network printers that are assigned to said network keypad;

retrieving said selected document; and

20 printing said selected document to said destination network printers via said LAN.

7. A network keypad using in the network printing system of claim 1 comprising:

a keypad for user to indicate the selected document; and

25 means for issuing the print-request that includes identification information of said selected document and said network keypad to the server of said network printing system, and said print-request causes said server, in accordance with the assignment of network printers to network keypads, to print said selected document to an appropriate destination printer among one or more network printers assigned to said network keypad.

8. A printer using in the network printing system of claim 1, comprising a network keypad of claim 7.

30 9. A network printing system comprising:

a LAN;

a plurality of network printers;

a plurality of network keypads; and

a server connecting by use of said LAN to said plurality of network printers and said plurality of network keypads;

an assignment that assigns said plurality of network printers to said plurality of network keypads;

5 each of said plurality of network keypad comprising:

a keypad for user to indicate selected document; and

means for issuing, to said server via said LAN, the print-request that includes identification information of the selected document and the assisting information that assists said server in determining a destination printer;

10 said server comprising:

means for receiving, via said LAN, the print-request issued by any of said plurality of network keypads;

means for decoding said print-request to identify said selected document and said assisting information;

15 means for determining a destination printer according to said assisting information, and said destination printer is among one of more printers that are assigned, in accordance with said assignment, to said keypad that issues said print-request;

means for retrieving said selected document; and

means for printing said selected document to said destination printer via said LAN.

20

10. A network printing system comprising:

a LAN;

a plurality of network printers;

a plurality of network input devices; and

25 a server connecting by use of said LAN to said plurality of network printers and said plurality of network input devices;

each of said plurality of network input devices comprising:

means for the user to indicate the selected document; and

30 means for issuing, to said server via said LAN, the print-request that includes the identification information of said network input device and said selected document;

said server comprising:

an assignment that assigns said plurality of network printers to said plurality of network input devices;

means for receiving, via said LAN, the print-request issued by any of said plurality of network input devices;

means for decoding said print-request to identify the selected document and the network input device that issues said print-request;

5 means for determining, in accordance with said assignment, an appropriate destination printer among one or more printers assigned to said network input device;

means for retrieving said selected document; and

means for printing said selected document to said destination printer via said LAN.

10 11. A keypad device, for sending documents via a LAN or a direct cable to a printer for printing, including:

a keypad for user to indicate the selected document;

a microprocessor;

an interface for sending documents to the printer;

15 memory for storing documents; and

means for receiving the identification of a selected document from said keypad, retrieving said selected document from said memory, and sending said selected document, via a LAN or a direct cable, to a printer to cause said printer prints said selected document.

20

12. A network mail delivery system, which prints the senders' letters in the recipients' printers, including:

computer network;

means for receiving senders' letters, which address to the recipients, via said

25 computer network;

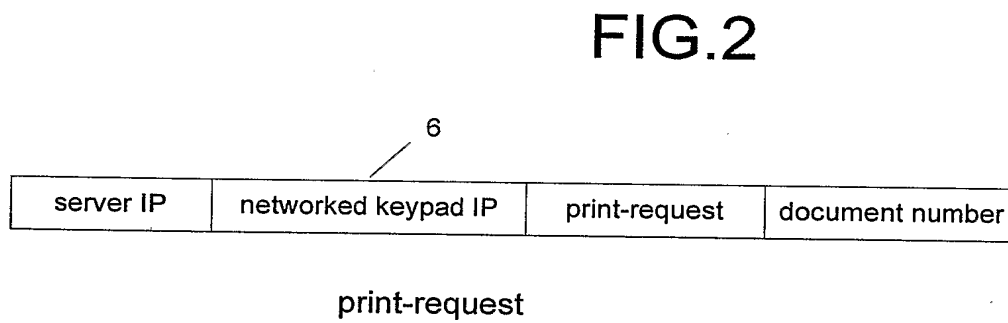
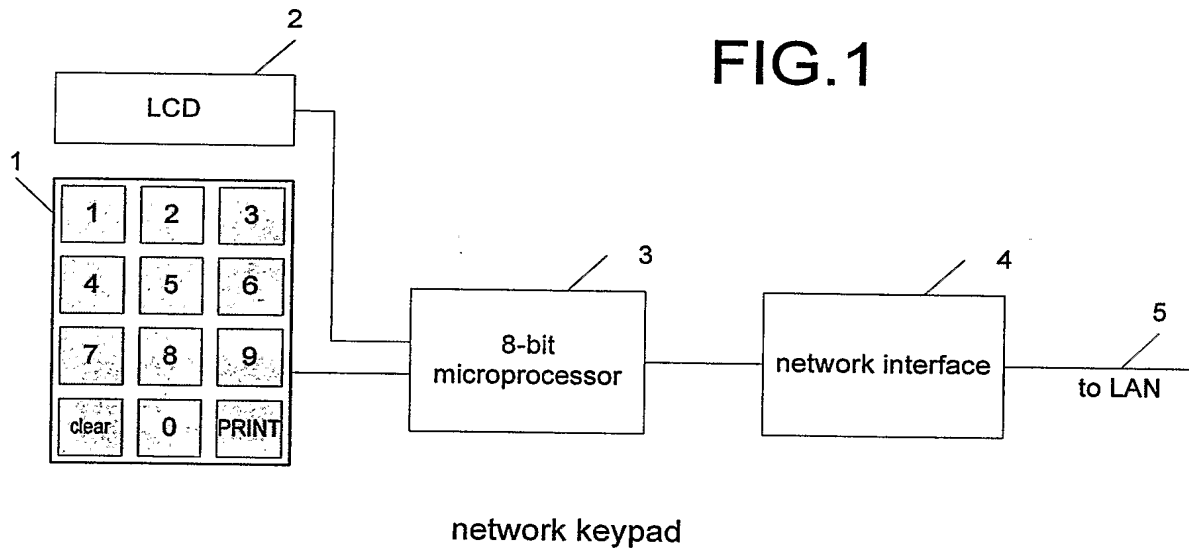
means for storing said received senders' letters;

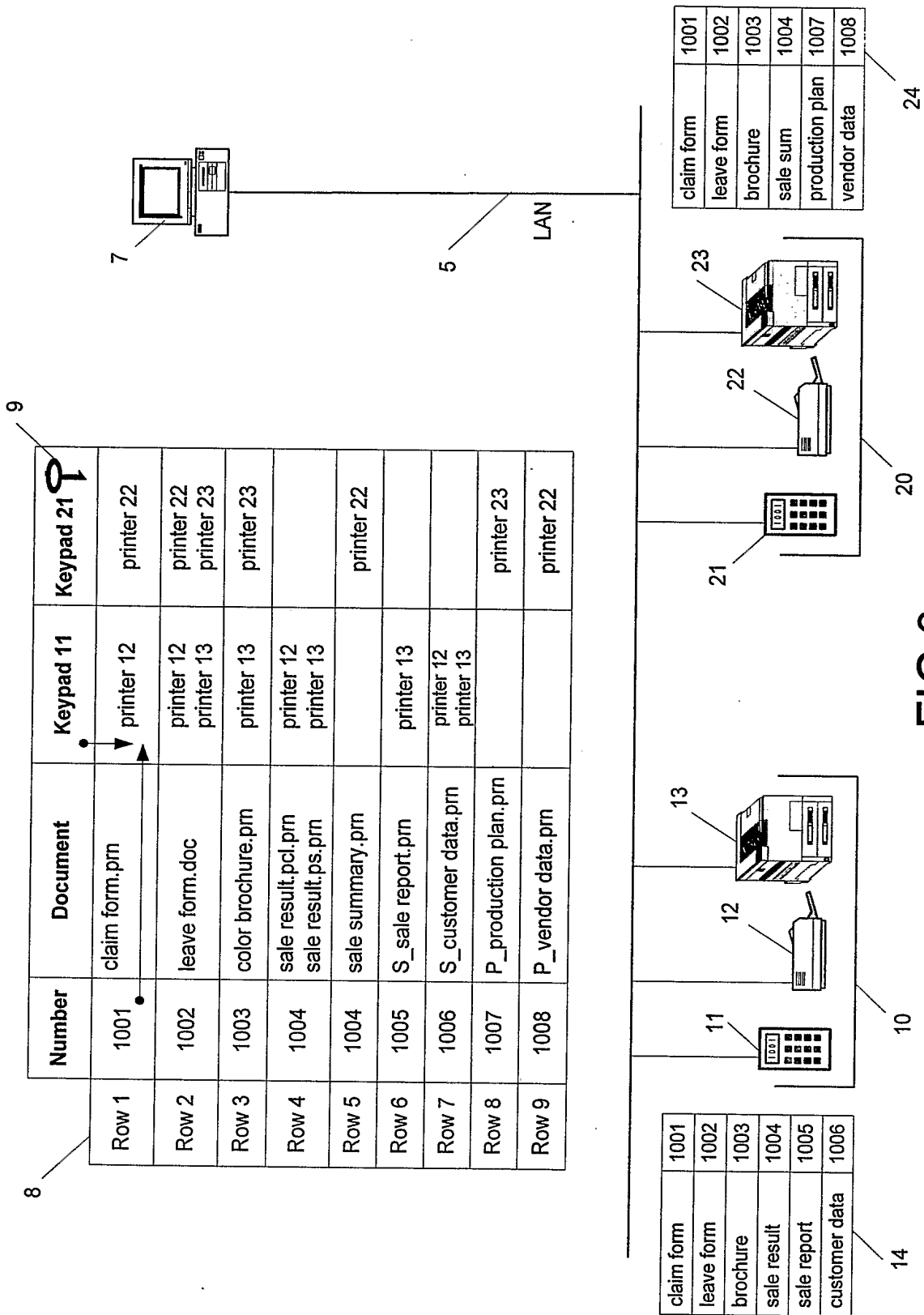
means for receiving the identifications of the recipients via said computer network, retrieving the sender's letters addressing to said recipients, and sending and printing said senders' letters via said computer network in the printers near the recipients.

30

Abstract

By using network keypads, this invention provides a simple and easy way to print electronic forms (documents). A network printing system includes a LAN, a server,
5 network printers and network keypads. A method for printing a document includes: (1) a user presses number keys to enter document number on a keypad; (2) the keypad sends to the server a print-request that includes the document number and the keypad IP address; (3) the server receives the print-request and identifies the document and the keypad; (4) in order to print the document at an appropriate printer such as near to the
10 user and suitable to print the document, the server, in accordance with an assignment that assigns printers to keypads, determines an appropriate printer among the printers that are assigned to the keypad; (5) the server retrieves the document; and (6) the server prints the document to the appropriate printer via the LAN.





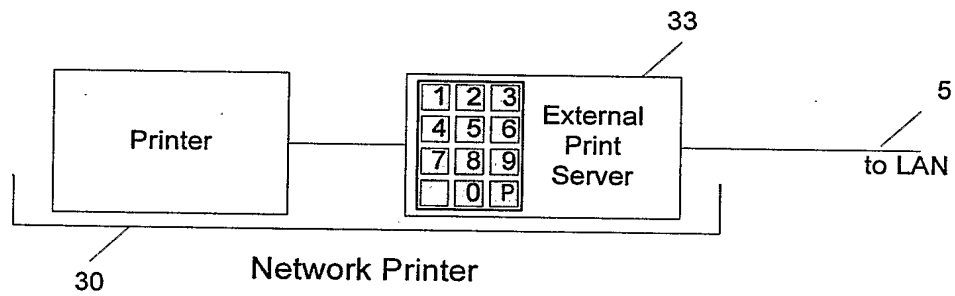
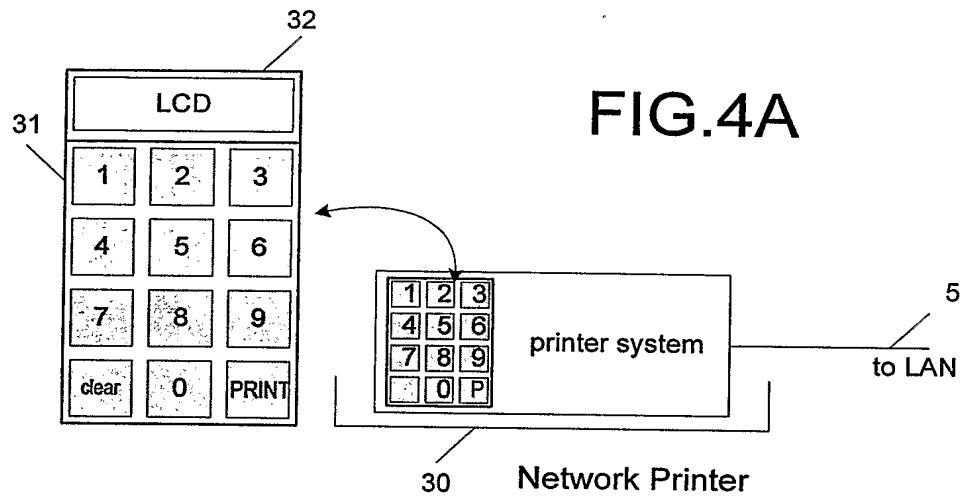
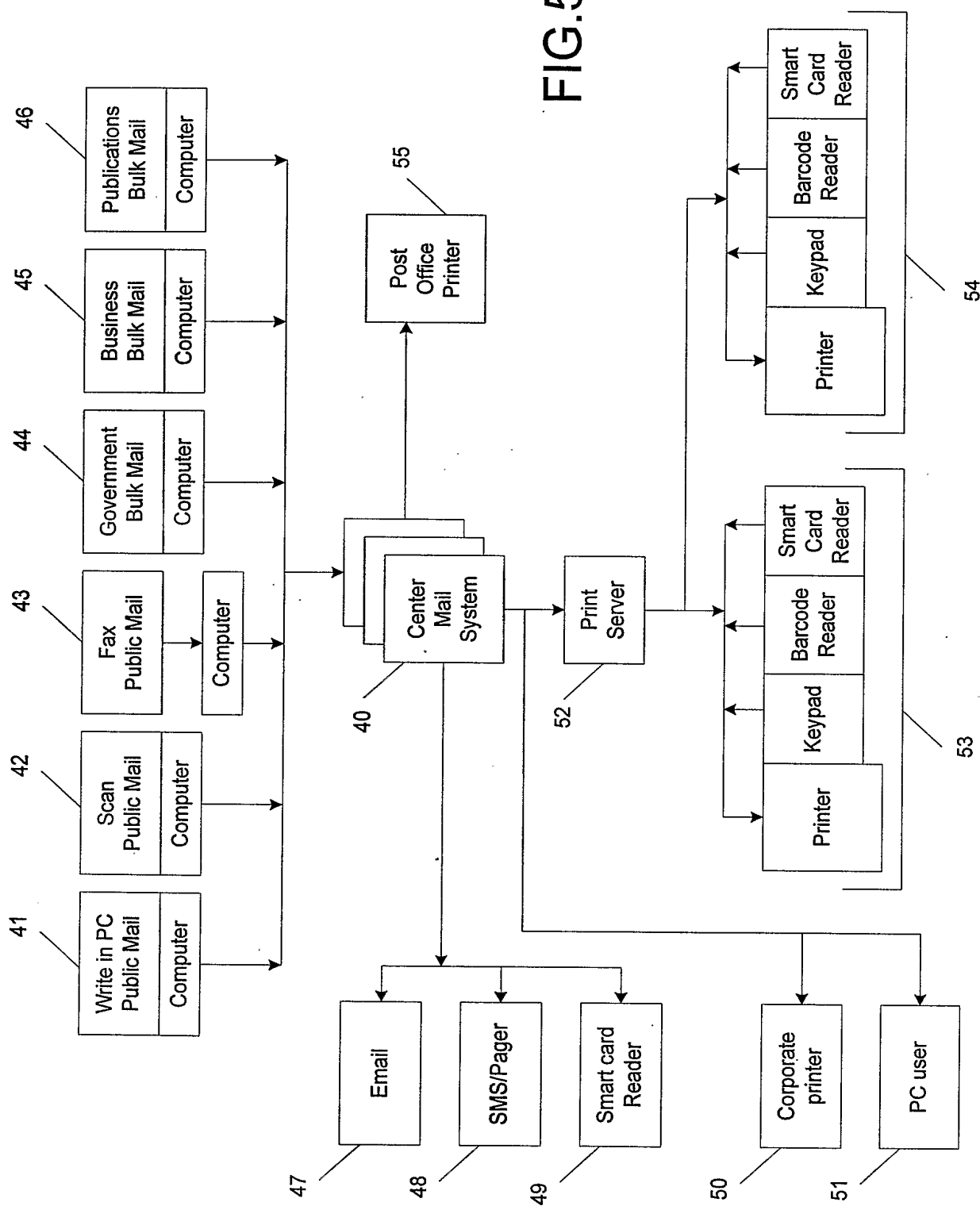


FIG. 5



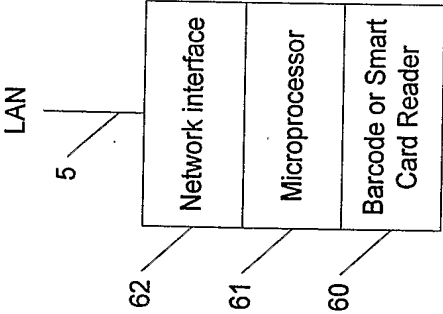


FIG. 6

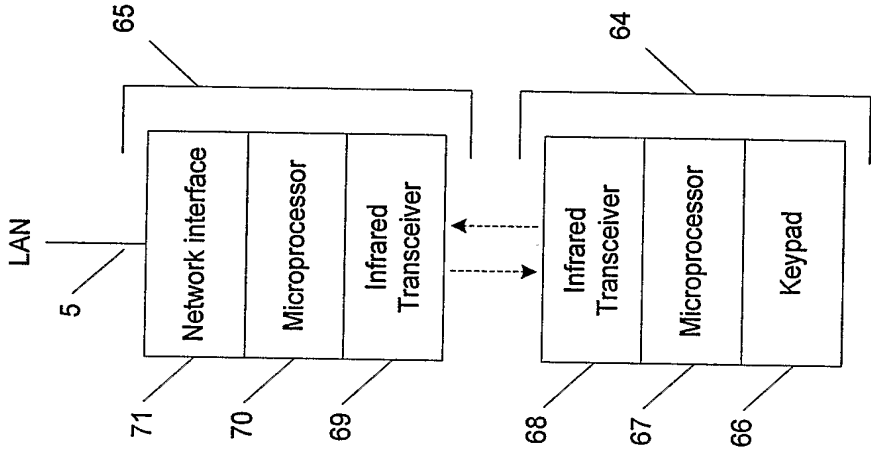


FIG. 7

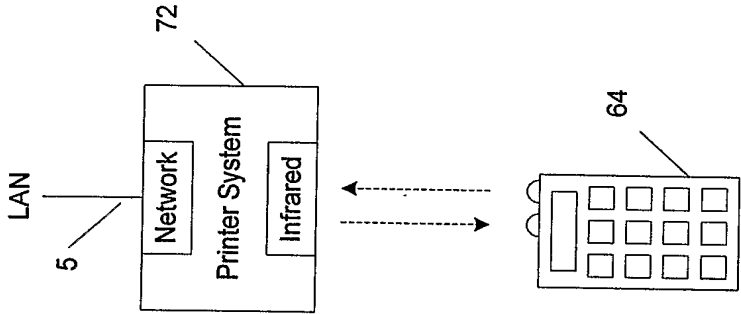


FIG. 8

FIG.9

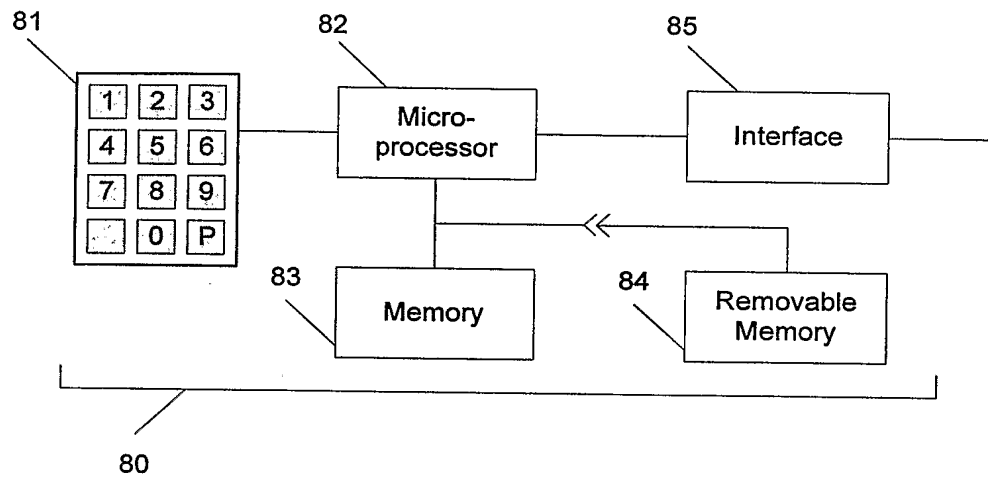


FIG.10

